



City of Bellingham
Public Works Department

January 8, 2016

WA0023744

United States Environmental Protection Agency, Region 7
Attn: Biosolids Center
11201 Renner Boulevard
Lenexa, KS 66219

Dear Biosolids Center:

I've enclosed the 2015 40 CFR 503 Report for the City of Bellingham Washington's two sewage sludge incinerators at the Post Point Wastewater Treatment Plant. Included with the 40 CFR 503 Report is sludge metals and operational data for both incinerators. In this report we continue to report the daily averages derived from hourly averages for venturi differential, wet electrostatic precipitator, temperature, oxygen, and total hydrocarbon (corrected), during the time sludge was fed to the incinerators. Also included are the summary reports of quarterly quality assurance audits run on our continuous emission monitoring devices.

With this submittal we demonstrate our commitment to continue to meet all regulatory obligations as described in the federal code. Please let me know if you require additional information from our facility.

Sincerely,

A handwritten signature in blue ink, appearing to read "R. Johnson".

Robert Johnson
Superintendent of Plants

Engineering
104 W. Magnolia Street, Suite 109
Bellingham, WA 98225
(360) 778-7900
Fax: (360) 778-7901
TTY: (360) 778-8382
pw@cob.org

Natural Resources
Physical: 2200 Nevada Street
Mailing: 2221 Pacific Street
Bellingham, WA 98229
(360) 778-7800
Fax: (360) 778-7801
pw@cob.org

Operations
2221 Pacific Street
Bellingham, WA 98229
(360) 778-7700
Fax: (360) 778-7701
pw@cob.org

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City of Bellingham, Washington

2015 Monitoring Results and Supporting Documentation

SUBMITTED TO: Biosolids Center, USEPA Region 7

DATE: January 7, 2016

REPORT DATE: January 01 to December 31, 2015

INTRODUCTION

This report is to fulfill the City of Bellingham's (City) requirement to monitor and report as per USEPA specifications outlined in 40 CFR Part 503 sections 503.45, 503.46, 503.47, and 503.48. The following sections present each parameter monitored along with its associated regulatory reference, and any pertinent information. To help illustrate the City of Bellingham's compliance with 40 CFR 503, there are three tables in the text and seven attachments which outline data points, calculated data points, and the data used in the derivation of calculated limitations.

Table 1 outlines the metals limitations for the City's incinerators and applicable parameters in the determination of limitations, and the values obtained for the 2015 reporting year. Actual sludge feed metals concentrations in mg/kg db are presented in *Appendix 1*. Metals concentration limitation calculations on a metal by metal basis are diagrammed in *Appendix 2.0*. *Appendix 3.0* shows the control variables utilized in determination of metal limitations. The laboratory reports from the certified lab analyzing incinerator cake metals are included in *Appendix 7.0* (the associated QA/QC documentation can be sent upon your request).

Table 2 outlines the monthly averages for the non-metal reporting requirements for incinerators one and two. *Table 3* outlines the averages and maximums for sludge feed to both incinerators. *Appendix 4.0* diagrams the frequency of monitoring and type of reported value for all parameters. *Appendix 5.0* diagrams the 2015 averages for non-metals reporting parameters on a daily interval for those dates when sludge was fed to either incinerator. *Appendix 6.0* contains the summary report from each of the quality assurance audits (QAA) performed in 2015 by Bellingham treatment plant staff on the continuous emission monitors. One audit was performed by a third party and those results are not included here, but are available upon request. Supporting documentation for each QAA can also be provided upon request.

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INCINERATOR OPERATIONAL MONITORING PARAMETERS

Parameter: Heavy Metals Content in Sludge

Regulation: 40 CFR 503.43, 40 CFR 503.46 (a), 40 CFR 503.47 (a) & (b), 40 CFR Part 61 (c) & (e)

Composited incinerator feed samples are required to be collected for metals analysis at a minimum of every 60 days, as outlined in Table 1 of 40 CFR 503.46. Table 1 below outlines the limitations for incinerator feed metal concentrations, as well as the average levels detected for the 2015 reporting year. When no metal was detected in the sample, half of the detection limit value was utilized to derive averages. All values for sludge feed metals tested in 2015 were below the calculated limitation.

To derive metals limitations, the maximum allowable sludge feed throughput rate (3450 dry pounds an hour) was utilized. Variables for determining metals limitations are outlined in Appendix 3.0. Because the City operates two incinerators, the lowest metal specific control efficiency (CE) value obtained for both incinerators was utilized as the most appropriate variable. The lowest CE value overall was utilized for determination of the mercury limitation as the analytical results did not support the materials balance required to calculate CE for mercury.

The RSC for chromium, as obtained from Table 2 of Part 503.43 is 0.016 micrograms per cubic meter. This criterion is used in lieu of the optional method based on the fraction of hexavalent chromium to total chromium.

Table 1. Compliance evaluation for sludge feed metals limitations (2015 data).

Metal	Dispersion Factor (ug-s/g-cu-m)	Control Efficiency	Emission Rate as Tested (mg/min)	Calculated Sludge Limitation per Metal (mg/kg db)	Average Sludge Concentration as Tested (mg/kg db)	Compliance (Y/N)
Arsenic	16.5	0.99775	0.08	1425	<3.4	Y
Beryllium	16.5	0.99540	0.01	58	<0.17	Y
Cadmium	16.5	0.99821	0.25	4439	<0.8	Y
Chromium	16.5	0.99951	0.24	4552	14	Y
Lead	16.5	0.99954	0.97	45461	21	Y
Mercury	16.5	0.99540	56.83	18521	0.286	Y
Nickel	16.5	0.99807	0.87	144470	10	Y

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Parameter: Incinerator Combustion Temperature

Regulation: 40 CFR 503.45 (d) & (e), 40 CFR 503.46 (b), 40 CFR 503.47 (a) & (f), 40 CFR 60.153(b)(3)

Combustion temperature was recorded from the highest thermocouple measurements from the hottest temperature hearth of each burning furnace. This information is recorded through the plant supervisory control computer system (SCADA) and computed in hourly averages. Maximum combustion temperatures are computed using the arithmetic mean of the temperature in the hottest zone of the furnace where the temperature is averaged and recorded from hourly averages for the hours the incinerator operates in a day (Appendix 5.0).

Temperature results are reported in terms of average daily combustion temperatures for each incinerator each month. Average monthly combustion temperatures and maximum daily temperature values, are obtained from hourly averages from the hottest burning hearth from each incinerator. Monthly averages are outlined in Table 2. The daily averages, monthly average and maximum daily temperature for each month are outlined in Appendix 5.0.

Temperature values recorded and reported cover only those incinerator operational periods when sludge feed had occurred. The operational target for combustion temperature is to not exceed a maximum hourly average of 1,890° F as calculated by specifications in 40 CFR 503.45 (e), utilizing CH2M Hill Technical Memorandum No. 2 dated August 17, 1993. As shown in Table 2 and Appendix 5.0, at no time did the average daily temperature of the hottest burning hearth exceed the temperature of 1890° F. Therefore, all averages reported for incinerator combustion in 2015 were below the target of 1890° F.

Parameter: Venturi Scrubber Differential Pressure

Regulation: 40 CFR 503.45 (f), 40 CFR 503.46 (c), 40 CFR 503.47 (a) & (g), 40 CFR 60.153 (b)(1)

The venturi scrubber differential pressure is monitored continuously by a pressure transducer/transmitter connected to both ends of the venturi throat. This information is recorded by computer in hourly averages. The results are reported in terms of daily average venturi differential pressure values for each incinerator for each month. Venturi differential pressure values recorded and reported cover only those incinerator operational periods when sludge feed had occurred. Venturi differential values obtained for each incinerator in 2015 are outlined in Table 2 and Appendix 5.0. The operational target on venturi scrubber pressure drop minimum is proposed as 15 inches water column ("wc) as described in CH2M Hill's Technical Memorandum No. 3 dated August 16, 1993.

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All monthly averages reported for incinerator venturi scrubber differential pressures in 2015 were above the minimum interim limitation of 15 inches water column. As shown in Table 2, the yearly average venturi differential pressure for both incinerators 1 and 2 were 31" wc and 29" wc respectively.

Parameter: **Wet Electrostatic Precipitator Charge Voltage**

Regulation: 40 CFR 503.45 (f), 40 CFR 503.46 (c), 40 CFR 503.47 (a) & (g)

The wet electrostatic precipitator (ESP) charge voltage is monitored continuously by a voltage transducer/transmitter on the secondary coil of the ESP transformer. This information is recorded by the SCS system in hourly averages. The results are reported in terms of average daily wet ESP charge kilovolt (kv) values for each incinerator for each month. Wet ESP charge voltage values recorded and reported cover only those incinerator operational periods when sludge feed had occurred. Wet ESP values obtained for each incinerator in 2015 are outlined in Table 2 and Appendix 5.0. The operational target on the wet ESP charge voltage minimum is proposed as 35 kilivolts as described in the 02/01/99 letter by Geoenergy submitted with the City of Bellingham's 1998 40 CFR 503 report. All monthly averages reported for incinerator wet ESP charge voltages in 2015 were above the minimum interim limitation of 35 kilivolts. As shown in Table 2, the annual average wet ESP voltage for incinerator 1 was 50 kV, and the annual average voltage for incinerator 2 is 56 kV.

Parameter: **Total Hydrocarbons, Oxygen, and Moisture Content in Stack Exhaust**

Regulation: 40 CFR 503.44, 40 CFR 503.45 (a), (b) & (c), 40 CFR 503.46 (b), 40 CFR 503.47 (a), (c), & (h)

The total hydrocarbon, oxygen and moisture in both stack exhaust streams are monitored by continuous emission monitoring (CEM) systems. Total hydrocarbons are corrected to 7 percent oxygen and 0 percent moisture using values from the oxygen analyzer and the moisture monitoring equipment. This information is recorded continuously by the computer and calculated into hourly averages. The results are reported in terms of average daily *corrected* total hydrocarbon values for each incinerator for each month. Total hydrocarbon values recorded and reported cover only those incinerator operational periods when sludge feed had occurred. Total hydrocarbon and oxygen values obtained for each incinerator in 2015 are outlined in Table 2 and Appendix 5.0. All values reported for incinerator stack exhaust total hydrocarbon in 2015 were well below the limitation of 100 ppm total corrected hydrocarbon.

The CEM systems undergo daily drift checks as specified, and undergo an annual relative accuracy and testing audit (RATA) as performed by a third party contractor. The results of this RATA are submitted to the regional air pollution authority, the Northwest Clean Air Agency.

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In 2015 the CEM systems passed all quarterly cylinder gas audits and drift tests (in-house audits included in Appendix 6.0). During 2015 three cylinder gas audits and calibration drift tests were performed in-house on the hydrocarbon and oxygen monitors as per the specifications in the EPA guidance manual *THC Continuous Emission Monitoring Guidance for Part 503 Sewage Sludge Incinerators* (EPA 833-B-94-003). The fourth gas audit and calibration test was completed by a third party concurrently with the RATA. All audits showed satisfactory performance of both continuous emission monitoring systems for seven day drift tests, response time, and certified gas calibration.

Data capture rates were recorded to indicate the percentage of time that the CEM systems were functioning during periods sludge was fed to either incinerator. The yearly average CEM data capture rate for incinerator 1 was 99 percent. The yearly average CEM data capture rate for incinerator 2 was 100 percent. Redundancy in CEM systems helps to ensure optimum data capture rates.

Parameter: Sewage Sludge Feed Rate

Regulation: 40 CFR 503.47 (a), & (j), 40 CFR 60.153(1)

The incinerator sludge feed rate is monitored continuously by a hydraulic piston sludge feed pump. The sludge pump flow meter measures volumetric displacement of sludge. This volumetric displacement value is multiplied by daily lab values for the percent of dry solids, and the assumed density of 8.34 to compute mass feed rate of dry solids. Flow information and mass feed rate determinations are recorded by the computer in 24-hourly averages. The results are reported in terms of daily average hourly and daily maximum hourly sludge feed rate values for each incinerator for each month, daily average and maximum totalized feed rate values and combined feed to both incinerators. Sludge feed values obtained for each incinerator in 2015 are outlined in Table 3. The maximum limitation on the totalized dry sludge fed is proposed as 3,450 pounds/hour as described in William P. McCourt's letter to Dick Hetherington dated April 4, 1994. All values reported for incinerator feed in 2015 were below the operational goal of 3,450 dry pounds an hour for both combined average and combined maximum hourly feed rates.

City of Bellingham, Washington Post Point Wastewater Treatment Plant

Table 2. Non-metals reporting parameters.

**POST POINT INCINERATOR MONTHLY 40 CFR 503 UPDATE
INCINERATOR #1 AND #2 503 INFORMATION FOR THE YEAR 2015**

Month 2015	INCINERATOR 1 AVERAGES					INCINERATOR 2 AVERAGES					
	Combust. Temp (F)*	CEM Data Capture (%)	Venturi Differential ("wc)*	Wet ESP (kV)*	Total HC (ppm corrected)*	Max Combust. Temp (F)	Combust. Temp (F)*	CEM Data Capture (%)	Venturi Differential ("wc)*	Wet ESP (kV)*	Total HC (ppm corrected)
January	1507	93	28	45	5	1596	1510	100	26	48	7
February	1534	100	30	45	4	1590	1514	100	24	49	5
March	1476	100	29	42	4	1568	1490	100	27	56	8
April	1511	100	30	41	3	1592	1441	100	30	61	6
May							1482	100	31	61	8
June							1508	100	33	60	9
July	1528	100	30	41	3	1571					1579
August	1524	100	29	51	3	1589					
September	1548	100	30	60	3	1596					
October	1552	100	28	60	3	1612					
November	1534	100	36	59	4	1596					
December	1483	100	35	59	4	1567					
Average	1520	99	31	50	4	1588	1491	100	29	56	7
Minimum	1476	93	28	41	3	1567	1441	100	24	48	5
Maximum	1552	100	36	60	5	1612	1514	100	33	61	9
	1890 MAX		15" MIN	35 kv MIN	100 ppm MAX	1890 MAX			15" MIN	35 kv MIN	100 ppm MAX

*Daily average of hourly averages for the period sludge was fed to this incinerator.

**POST POINT INCINERATOR MONTHLY CFR 503 UPDATE
INCINERATOR #1 and #2 503 INFORMATION FOR THE YEAR 2015**

Sludge Feed Rates

	Incin #1 Ave. Feed (dry #/hr) hourly ave	Incin #2 Ave. Feed (dry #/hr) hourly ave	Incin #1 Max Feed (dry #/hr) hourly ave	Incin #2 Max Feed (dry #/hr) hourly ave	Totalized Sludge Feed Incinerators 1 & 2 Ave. Feed (dry #/(hr) hourly ave	Max. Feed (dry #/hr) hourly ave
2015						
January	879	882	1224	1000	908	1529
February	795	960	948	1238	871	1238
March	795		972		795	972
April	795	915	1092	1068	847	1092
May		781		880	781	880
June		835		969	835	969
July	755	765		913	759	913
August	776		876	931	776	776
September	822				822	1190
October	829				829	1125
November	950				950	1260
December	886				886	1159
Average:	828	856	1078	1011	838	1092

Appendix 1.0 Incinerator Feed Metals Concentrations.

City of Bellingham Department of Public Works
Post Point Pollution Control Plant
Incinerator Feed Metals Results 2015

Date	Arsenic (mg/kg)	Beryllium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)
01/12/15	<2.9	<0.145	<0.725	21
03/18/15	<2.6	<0.13	<0.652	13
05/19/15	<7.8	<0.39	<1.96	13
07/20/15	<3.1	<0.16	<0.79	11.8
09/15/15	<11.9	<0.59	<2.97	10.4
11/08/15	<12.1	<0.61	<3.0	13.6
AVERAGE:	< 3.4	< 0.17	<0.8	14
LIMITATION:	1425	57.9	4439	4552

Date	Lead (mg/kg)	Mercury (mg/kg)	Nickel (mg/kg)	Total Solids (%)
01/12/15	21	0.198	14	22.1
03/18/15	16	0.124	10.0	23.8
05/19/15	22	0.104	7	23.9
07/20/15	35	0.279	9.3	22.9
09/15/15	<11.9	0.230	6.9	21.9
11/08/15	24.8	0.781	11.8	24.2
AVERAGE:	21	0.286	10	23.1
LIMITATION:	45461	18521	144470	

All values reported on a dry basis.

< = not detected at specified detection level.

One-half of specified detection level utilized to derive averages.

INCINERATOR FEED METALS CONCENTRATIONS

METALS LIMITATION

(mg/kg)

LEAD :

$$\text{Lead} = \frac{0.1 * \text{NAAQS} * 86,400}{\text{DF} * (1-\text{CE}) * 37.56} = \frac{12960}{0.28508} = 45461$$

WHERE:

Lead NAAQS	=	1.5 ug/cu-m
Dispersion Factor (DF)	=	16.5 ug-s/g-cu-m
Control Efficiency (CE)	=	0.99954
Maximum Hourly Sludge Feed at 3450 dry #/hr	=	37.56 metric tons a day
Maximum Allowable Feed Throughput Rate	=	3450 dry#/hour

POST POINT 2015 AVERAGE LEAD CONCENTRATION = 21 MG/KG DB

METALS LIMITATION

(mg/kg)

ARSENIC:

$$\text{Arsenic} = \frac{\text{RSC} * 86,400}{\text{DF} * (1-\text{CE}) * 37.56} = \frac{1987.2}{1.394415} = 1425$$

WHERE:

Arsenic RSC (503)	=	0.023 ug/cu-m
Dispersion Factor (DF)	=	16.5 ug-s/g-cu-m
Control Efficiency (CE)	=	0.99775
Maximum Hourly Sludge Feed at 3450 dry #/hr	=	37.56 metric tons a day
Maximum Allowable Feed Throughput Rate	=	3450 dry#/hour

POST POINT 2015 AVERAGE ARSENIC CONCENTRATION = < 3 MG/KG DB

INCINERATOR FEED METALS CONCENTRATIONS

METALS LIMITATION

(mg/kg)

CADMIUM:

$$\text{Cadmium} = \frac{\text{RSC} * 86,400}{\text{DF} * (1-\text{CE}) * 37.56} = \frac{4924.8}{1.109335} = 4439$$

WHERE:

Cadmium RSC (503)	=	0.057 ug/cu-m
Dispersion Factor (DF)	=	16.5 ug-s/g-cu-m
Control Efficiency (CE)	=	0.99821
Maximum Hourly Sludge Feed at 3450 dry #/hr	=	37.56 metric tons a day
Maximum Allowable Feed Throughput Rate	=	3450 dry#/hour

POST POINT 2015 AVERAGE CADMIUM CONCENTRATION = <0.8 MG/KG DB

METALS LIMITATION

(mg/kg)

CHROMIUM:

$$\text{Chromium} = \frac{\text{RSC} * 86,400}{\text{DF} * (1-\text{CE}) * 37.56} = \frac{1382.4}{0.303673} = 4552$$

WHERE:

Chromium RSC (Table 10, 503)	=	0.016 ug/cu-m, Table 10 of Part 503 used in lieu of hexavalent Cr.
Dispersion Factor (DF)	=	16.5 ug-s/g-cu-m
Control Efficiency (CE)	=	0.99951
Maximum Hourly Sludge Feed at 3450 dry #/hr	=	37.56 metric tons a day
Maximum Allowable Feed Throughput Rate	=	3450 dry#/hour

POST POINT 2015 AVERAGE CHROMIUM CONCENTRATION = 14 MG/KG DB

INCINERATOR FEED METALS CONCENTRATIONS

METALS LIMITATION

(mg/kg)

NICKEL:

$$\text{Nickel} = \frac{\text{RSC} * 86,400}{\text{DF} * (1-\text{CE}) * 37.56} = \frac{172800}{1.196098} = 144470$$

WHERE:

Nickel RSC (503)	=	2,000 ug/cu-m
Dispersion Factor (DF)	=	16.5 ug-s/g-cu-m
Control Efficiency (CE)	=	0.99807
Maximum Hourly Sludge Feed at 3450 dry #/hr	=	37.56 metric tons a day
Maximum Allowable Feed Throughput Rate	=	3450 dry#/hour

POST POINT 2015 AVERAGE NICKEL CONCENTRATION = 9.8 MG/KG DB

METALS LIMITATION

(mg/kg)

BERYLLIUM:

$$\text{Beryllium} = \frac{\text{ER}}{\text{SF} * (1 - \text{CE})} = \frac{10}{0.172776} = 57.9$$

WHERE:

Beryllium (NESHAPS)	=	10 grams/24 hr operating
Dispersion Factor (DF)	=	16.5 ug-s/g-cu-m
Control Efficiency (CE)	=	0.9954
Maximum Hourly Sludge Feed at 3450 dry #/hr	=	37.56 metric tons a day
Maximum Allowable Feed Throughput Rate	=	3450 dry#/hour

POST POINT 2015 AVERAGE BERYLLIUM CONCENTRATION = <0.2 MG/KG DB

INCINERATOR FEED METALS CONCENTRATIONS

METALS LIMITATION

(mg/kg)

MERCURY:

$$\text{Mercury} = \frac{\text{ER}}{\text{SF} * (1 - \text{CE})} = \frac{3200}{0.172776} = 18521$$

WHERE:

Mercury ER (NESHAP)	=	3,200 g/24 hr operating
Dispersion Factor (DF)	=	16.5 ug-s/g-cu-m
Control Efficiency (CE)	=	0.99540 (Taken from Incinerator #1 Be)
Maximum Hourly Sludge Feed at 3450 dry #/hr	=	37.56 metric tons a day
Maximum Allowable Feed Throughput Rate	=	3450 dry#/hour

POST POINT 2015 AVERAGE MERCURY CONCENTRATION = 0.29 MG/KG DB

Appendix 3.0 The control variables utilized in determination of metal limitations

CITY OF BELLINGHAM INCINERATOR CONTROL VARIABLES

Control Efficiency Determination: Incinerator 1

Test Sludge Feed Rate (dry) 1,514 lb/hr

Pollutant	Dispersion Factor (ug-s/g-cu-m)	Control Efficiency	Emission Rate as Tested (mg/min)	Sludge Feed Both Incinerators (met-tons/day)
Arsenic	16.5	0.99879	0.03	37.56
Beryllium	16.5	0.99540	0.005	37.56
Cadmium	16.5	0.99918	0.08	37.56
Chromium	16.5	0.99951	0.16	37.56
Lead	16.5	0.99982	0.24	37.56
Mercury	16.5	-1.44351	18.9	37.56
Nickel	16.5	0.99931	0.22	37.56

Control Efficiency Determination: Incinerator 2

Test Sludge Feed Rate (dry) 1,955 lb/hr

Pollutant	Dispersion Factor (ug-s/g-cu-m)	Control Efficiency	Emission Rate as Tested (mg/min)	Sludge Feed Both Incinerators (met-tons/day)
Arsenic	16.5	0.99775	0.05	37.56
Beryllium	16.5	0.99551	0.005	37.56
Cadmium	16.5	0.99821	0.17	37.56
Chromium	16.5	0.99978	0.08	37.56
Lead	16.5	0.99954	0.73	37.56
Mercury	16.5	-1.53405	37.93	37.56
Nickel	16.5	0.99807	0.64	37.56

*Most variables taken from CH2M Hill Technical Memorandum dated Feb. 18, 1994.

Appendix 4.0 The frequency of monitoring and type of reported value for all parameters

**CITY OF BELLINGHAM WASTEWATER TREATMENT PLANT
INCINERATOR MONITORING PLAN SUMMARY**

PARAMETER	RECORDING FREQUENCY	REPORTED VALUE	REGULATORY PROGRAM	PROPOSED LIMITATION
HEAVY METALS IN SLUDGE	60 DAYS	EACH 60-DAY RESULT	40 CFR 503, 40 CFR 61 (NESHAPS)	SEE TABLE 1
COMBUSTION TEMPERATURE	HOURLY AVERAGE	AVERAGE OF HIGHEST HOURLY VALUES WHILE BURNING/DAY	40 CFR 503	1,890° F
VENTURI SCRUBBER DIFFERENTIAL PRESSURE	HOURLY AVERAGE	AVERAGE HOURLY VALUES/MONTH AVES.	40 CFR 503	15 INCHES H2O
WET ESP CHARGE VOLTAGE	HOURLY AVERAGE	AVERAGE HOURLY VALUES/MONTH AVES.	40 CFR 503	35 kV
TOTAL HYDROCARBONS, & OXYGEN	HOURLY AVERAGE	AVERAGE HOURLY VALUES/MONTH AVES.	40 CFR 503	100 ppm
SLUDGE FEED RATE	DAILY TOTAL + MONTHLY TOTAL	AVERAGE & MAX of 24-hour VALUES & MONTH TOTAL	40 CFR 503	3450 dry#/hr

*All reportable parameters for 40 CFR 503 are to be averaged and reported only for the periods that have sludge feed confirmed.

40 CFR 503

Interior

Incinerators

Both Incinerators												40 CFR 503												
Incin #1												Incin #2												
	Gr	Ash	Scrn	Grit	Gas	Per Day	Per Hour	Hearth Burn	Venturi Avg	Wet ESP Avg	THC Avg	CEM Capture	Hearth	After Burn	Venturi Avg	Wat ESP Avg	THC Avg	CEM Capture						
Bm	Gr	Scrn	Grit	Gas	Per Day	Per Hour	Hearth Burn	Venturi Avg	Wet ESP Avg	THC Avg	CEM Capture	Hearth	After Burn	Venturi Avg	Wat ESP Avg	THC Avg	CEM Capture							
Brn	Rem	cuyd	cuyd	Tot	lb	lb	F	F	"wc	kV	ppm	%	F	F	"wc	kV	ppm	%						
Date	Gal																							
2/1/2015					63359	23079							1428	1262	22.9	48.5	3.5	100.0						
2/2/2015					57129	23381							1510	1180	23.3	48.8	6.2	100.0						
2/3/2015	40.0	2.30	4.0	55736	20572								1482	1263	24.9	49.5	3.0	100.0						
2/4/2015					60482	21586							1525	1300	25.5	49.6	2.7	100.0						
2/5/2015	60			46306	6131								1610	1306	24.6	48.5	6.1	100.0						
2/6/2015		2.30	2.0	53209	10719								1497	1338	23.0	49.5	4.6	100.0						
2/7/2015	100			44219	24930								1536	1137	21.8	49.4	6.8	100.0						
2/8/2015				60835	21551								1518	1258	22.4	49.3	4.2	100.0						
2/9/2015				56968	29715								1511	1170	22.8	48.7	10.3	100.0						
2/10/2015	100			50262	24014								1500	1223	24.6	48.7	3.0	100.0						
2/11/2015	40.0			53950	20076								1516	1192	26.9	48.8	4.6	100.0						
2/12/2015	120			58099	23459								1528	1238	26.0	48.9	4.5	100.0						
2/13/2015	1.50	1.0	71212	19212									1521	1382	27.3	49.1	2.8	100.0						
2/14/2015	120	0.00		38128	18622	776	1537	1044	31.0	45.3	6.3	100.0												
2/15/2015				38820	20058	836	1467	1119	30.1	44.6	4.8	100.0												
2/16/2015				37594	18259	761	1541	1123	30.2	45.0	3.9	100.0												
2/17/2015	1.50		35824	19335	806	1547	1186	30.6	44.2	2.9	100.0													
2/18/2015	40.0		32891	19337	806	1558	1138	30.1	43.4	4.0	100.0													
2/19/2015	225		33445	19172	799	1579	1092	29.1	43.4	5.7	100.0													
2/20/2015	1.50	2.0	23770	17528	730	1522	1227	30.0	44.8	2.9	100.0													
2/21/2015	40		22386	19922	830	1522	1160	29.4	45.2	3.5	100.0													
2/22/2015			20763	18143	756	1450	1195	30.7	45.6	3.1	100.0													
2/23/2015		2.0	25801	17716	805	1478	1120	28.7	44.1	5.0	100.0													
2/24/2015	75		23144	22761	948	1584	1080	28.0	44.5	7.2	100.0													
2/25/2015			21520	20153	840	1588	1129	29.6	45.0	4.6	100.0													
2/26/2015	40	40.0	2.0	18077	18023	751	1590	1104	29.7	44.9	4.5	100.0												
2/27/2015		1.50	22839	18265	761	1539	1196	28.9	45.6	3.3	100.0													
2/28/2015				17490	17108	713	1506	1156	30.5	44.6	3.6	100.0												
		18	27	53	52	242	240	305	215	213	266	270	268	274	216	214	267	269	271	275				
Ave	98	40.0	1.69	2.2	40866	23230	795	1534	1138	30	45	4	100	1514	1250	24	49	5	100					
Min	40	40.0	0.00	1.0	17490	713	713	1450	1044	28	43	3	100	1428	1137	22	49	3	100					
Max	225	40.0	2.30	4.0	71212	948	948	1590	1227	31	46	7	100	1610	1382	27	50	10	100					
	9	4	6	6	28	15	15	15	15	15	15	15	15	15	15	13	13	13	13	13	13			

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[sein #2] [sein #1]

Both Incinerators												Incin #1											
	Gr	Ash	Szem	Grit	Gas	Per	Per	After	Venturi	Wet ESP	THC	CEM	Capture	Hearth	Burn	After	Venturi	Wet ESP	THC	CEM	Capture		
Bin	Rem			Tot	Day	Hour	Hearth	Burn	Avg	"wc	kV	%	F	F	"wc	kV	ppm	ppm	ppm	ppm	%		
Date	Gal	cuyd	cuyd	cuyd	lb	lb	lb	lb	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm		
3/1/2015	75				18694	18147	756	157	1203	30.1	44.3	2.8	100.0										
3/2/2015	94				22139	17802	742	1482	1175	30.2	44.5	3.3	100.0										
3/3/2015					18429	18980	791	1568	1113	30.8	44.6	6.2	100.0										
3/4/2015					22017	19295	804	1523	1095	29.7	44.6	5.9	100.0										
3/5/2015	40				22823	19539	814	1494	1192	29.5	45.2	4.2	100.0										
3/6/2015	40.0	1.50			19449	20050	835	1446	1118	30.0	43.8	5.2	100.0										
3/7/2015	120				21795	19092	795	1411	1196	29.7	43.2	3.6	100.0										
3/8/2015					17558	19912	830	1470	1158	30.7	42.6	4.2	100.0										
3/9/2015		5.0			22472	17148	715	1330	1241	29.7	42.6	2.7	100.0										
3/10/2015		2.30			20807	17796	742	1402	1126	29.6	42.6	3.2	100.0										
3/11/2015					19668	19454	811	1494	1112	30.7	42.4	9.1	100.0										
3/12/2015					20606	19488	812	1492	1159	29.5	42.4	5.2	100.0										
3/13/2015	120	40.0	2.30	2.0	22140	20325	847	1456	1193	28.5	41.5	2.9	100.0										
3/14/2015					20271	20234	843	1441	1173	28.6	41.1	3.0	100.0										
3/15/2015	120				17339	21688	904	1525	1131	27.4	41.8	4.5	100.0										
3/16/2015					6.0	20885	20964	874	1469	1097	28.5	41.5	5.0	100.0									
3/17/2015	120	3.00			26080	12958	540	1417	1162	29.1	41.4	5.7	100.0										
3/18/2015	50				29815	13778	574	1467	1136	28.5	42.0	4.5	100.0										
3/19/2015	150				30194	13332	555	1513	1203	27.8	41.3	3.6	100.0										
3/20/2015					25827	16116	672	1503	1159	28.5	41.0	3.4	100.0										
3/21/2015	80				19712	20229	843	1462	1145	29.9	41.0	3.5	100.0										
3/22/2015					19787	17892	745	1481	1142	30.3	41.0	3.8	100.0										
3/23/2015		3.0			23212	20857	869	1476	1138	28.9	40.9	3.2	100.0										
3/24/2015	60	2.30			27016	22141	923	1510	1231	28.6	40.8	2.2	100.0										
3/25/2015			2.0		24662	19612	817	1499	1221	29.2	41.4	2.4	100.0										
3/26/2015	110	40.0			22890	21859	911	1529	1101	29.0	40.8	3.8	100.0										
3/27/2015		1.50	2.0		26508	20377	849	1487	1142	28.7	41.1	4.1	100.0										
3/28/2015	120				21405	23323	972	1502	1109	28.2	40.8	4.9	100.0										
3/29/2015					29907	19724	822	1461	1168	28.8	40.8	3.0	100.0										
3/30/2015		1.0			25133	19693	821	1478	1126	29.3	40.4	4.5	100.0										
3/31/2015	120	2.30			31830	19331	805	1464	1132	28.2	40.3	6.1	100.0										
	18	27	53	52	242	240	305	215	213	266	268	270	274	216	214	267	269	271	275				

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40 CFR 503
Locin #41
Incinerators

Both Incinerators										40 CFR 503									
Incin #1										Incin #2									
	Gr	Ash	Szem	Grit	Gas Tot	Per Day	Per Hour	Hearth Burn	After Venturi Avg	Wet ESP Avg	THC Avg	CEM Capture %	Hearth Burn	After Venturi Avg	Wet ESP Avg	THC Avg	CEM Capture %		
Bm	Gal	cuyd	cuyd	cuyd	lb	lb	F	F	"wc	kV	ppm	%	F	F	"wc	kV	ppm	CEM Capture %	
Date	6/1/2015	20	3.0	31454	18685								1482	1171	30.6	60.9	7.5	100.0	
	6/2/2015	100		32651	20298								1461	1200	30.1	60.4	6.4	100.0	
	6/3/2015			30309	22946								1429	1287	29.9	60.2	5.4	100.0	
	6/4/2015	120	3.0	34540	23262								1486	1232	30.4	60.0	7.8	100.0	
	6/5/2015	38.0	3.00	40504	17072								1460	1226	29.6	61.0	11.1	100.0	
	6/6/2015			28196	21130								1480	1217	29.9	61.1	19.9	100.0	
	6/7/2015	50		30131	19345								1546	1186	30.6	61.0	18.8	100.0	
	6/8/2015			3.0	32607	19493							1547	1187	30.2	61.1	16.0	100.0	
	6/9/2015	110	2.30	31745	18449								1479	1178	30.9	61.2	12.3	100.0	
	6/10/2015			31006	22582								1549	1183	30.5	60.9	7.1	100.0	
	6/11/2015		2.0	28986	22597								1558	1209	30.3	61.1	7.2	100.0	
	6/12/2015	34.0	2.30	27644	19378								1440	1231	31.3	60.9	4.2	100.0	
	6/13/2015	40		26479	20465								1391	1298	31.4	61.1	5.2	100.0	
	6/14/2015			25901	20050								1461	1312	31.2	60.9	4.9	100.0	
	6/15/2015		5.0	26445	21069								1407	1320	31.7	61.2	4.0	100.0	
	6/16/2015	50	1.50	26830	20623								1350	1215	31.8	61.2	3.7	100.0	
	6/17/2015			24978	17546								1298	1143	32.1	61.2	5.4	100.0	
	6/18/2015		3.0	33107	15313								1320	1130	31.4	60.7	7.6	100.0	
	6/19/2015	32.0	2.30	1.0	27899	20090							1468	1064	31.8	60.5	10.3	100.0	
	6/20/2015	120		29749	20086								1530	1220	31.5	60.7	5.2	100.0	
	6/21/2015			27604	19026								1513	1286	31.9	61.1	5.3	100.0	
	6/22/2015		3.0	25000	18453								1546	1161	32.1	61.4	7.3	100.0	
	6/23/2015	150	3.00	27554	19860								1550	1222	32.0	60.7	6.3	100.0	
	6/24/2015		5.0	25549	20111								1541	1189	32.2	60.9	6.0	100.0	
	6/25/2015			23422	20624								1542	1176	32.5	61.1	5.6	100.0	
	6/26/2015	40	32.0	1.50	1.0	20011	20185						1536	1160	32.0	61.0	6.9	100.0	
	6/27/2015					19770	19439						1590	1089	32.5	61.4	11.2	100.0	
	6/28/2015					21649	17943						1533	1153	32.6	61.3	5.9	100.0	
	6/29/2015					18449	17518						1508	1061	32.7	61.4	9.2	100.0	
	6/30/2015	40	2.30			21212	16671						1466	1204	33.1	60.7	5.5	100.0	
		18	27	53	52	242	240	305	215	213	266	268	270	274	216	214	267	269	271
																			275
Ave		76	34.0	2.28	2.9	27713	19492						1482	1199	31	61	8	100	
Min		20	32.0	1.50	1.0	18449							1298	1061	30	60	4	100	
Max		150	38.0	3.00	5.0	40504							1590	1320	33	61	20	100	
		11	4	8	10	30	0	0	0	0	0	0	30	30	30	30	30	30	

Both Incinerators												40 CFR 503													
												Inrin #1													
	Gr	Ash	Scm	Grit	Gas	Per Day	Per Hour	Hearth Burn	Venturi Avg	Wet ESP Avg	THC Avg	CEM Capture	Hearth	After Burn	Venturi Avg	Wet ESP Avg	THC Avg	CEM Capture	Inrin #2						
Bm	Rem	cuyd	cuyd	Tot	cuft	lb	lb	F	" wc	kV	ppm	%	F	F	" wc	kV	ppm	%							
Date	Gal																								
7/1/2015																									
7/2/2015	60					3.0	24328	16052																	
7/3/2015																									
7/4/2015	80																								
7/5/2015																									
7/6/2015		40.0																							
7/7/2015			2.30																						
7/8/2015																									
7/9/2015																									
7/10/2015	1.50	4.0																							
7/11/2015	60																								
7/12/2015																									
7/13/2015		36.0				2.0	41059	19031																	
7/14/2015	40						50774	16554																	
7/15/2015								47394	16910	705	1538	1136	31.3	36.2	4.0	100.0									
7/16/2015								42833	18801	783	1571	1127	30.4	37.2	3.5	100.0									
7/17/2015	100	1.50						41652	17107	713	1512	1010	30.6	36.6	5.5	100.0									
7/18/2015	40							42317	16196	675	1555	1095	30.1	38.6	4.7	100.0									
7/19/2015								44306	16891	704	1563	1170	29.7	42.1	3.0	100.0									
7/20/2015								40417	16681	695	1496	1166	30.2	41.7	2.2	100.0									
7/21/2015	50	38.0	1.50					26437	17984	749	1510	1116	29.9	42.0	3.3	100.0									
7/22/2015								29704	17403	725	1490	1087	29.3	42.2	2.5	100.0									
7/23/2015	60							31785	18824	784	1534	1103	29.3	42.4	1.8	100.0									
7/24/2015								40417	16681	695	1496	1192	30.0	42.7	1.5	100.0									
7/25/2015	70							26437	17984	749	1510	1116	29.9	42.0	3.3	100.0									
7/26/2015								35913	18289	762	1555	1198	29.0	43.3	1.7	100.0									
7/27/2015	80							36440	18816	784	1544	1190	28.7	43.2	1.8	100.0									
7/28/2015	100		1.50					28890	17404	725	1544	1138	30.1	42.8	2.4	100.0									
7/29/2015								30978	20609	824	1505	1096	29.0	43.6	5.6	100.0									
7/30/2015	110							30978	20609	859	1480	1141	28.3	43.3	4.6	100.0									
7/31/2015								24388	18498	771	1508	1108	29.2	41.6	3.7	100.0									
								27595	14019	876	1529	1164	27.8	41.8	4.1	100.0									
	18	27	53	52	242	240	305	215	213	266	268	270	274	216	214	267	269	271	275						
Ave	71	38.0	1.60	3.0	31704	16015	755	1528	1132	30	41	3	100	1508	1115	33	60	9	100						
Min	40	36.0	1.50	2.0	17948	675	675	1480	1010	28	36	2	100	1445	999	32	59	4	100						
Max	110	40.0	2.30	4.0	50774	876	876	1571	1198	31	44	6	100	1579	1184	34	61	19	100						
	12	3	3	8	5	31	17	17	17	17	17	17	17	17	17	17	14	14	14	14					

Post Point Pollution Control Plant Process Control Report

40 CFR 503

40 CFR 503

Post Point Pollution Control Plant Process Control Report

Post Point Pollution Control Plant Process Control Report

Date: 01/20/2015

2014 Audit of Fourth Quarter Accuracy Summary Report

City of Bellingham personnel conducted a Quarterly Accuracy Audit (QAA) on the Total Hydrocarbon (THC) and Oxygen (O₂) continuous emission monitoring systems (CEMS) installed as part of incinerators # 1 and #2 at the Post Point Wastewater Treatment Plant. Testing was conducted to meet the requirements of 40 CFR part 503 subpart E. Testing procedures were based on procedures set down in the EPA document "THC Continuous Emission Monitoring Guidance for Part 503 Sewage Sludge Incinerators" (EPA 833-B-94-003). The QAA consisted of a 7-day, 24 hour calibration drift test (CDT), performed on 01/9/2015 - 01/15/2015 for both CEMS1 and CEMS2, and a response time test (RTT) and calibration error test (CET), performed on 01/15/2015 for both CEMS1 and CEMS2.

Calibration Drift Tests

The CEMS automatically performs a CDT daily, using zero gas and span gas (70 to 90% of span). Calibration drift data for THC and O₂ were collected every 24 hours for the period from 01/9/2015 - 01/15/2015 for both CEMS 1 and CEMS2. The maximum 24-hour drift observed during the 7-day drift test is detailed below. Complete 7-day daily drift results are also provided with this report.

Calibration 7-Day Drift Test Result Summary

	Zero Drift (max day)	Span Drift (max day)	Criteria*
CEMS 1 O ₂ Dry	0.04 %	-0.15 %	$\leq 0.5\%$
CEMS 1 O ₂ Wet	0.07 %	-0.16 %	$\leq 0.5\%$
<u>CEMS 1 THC</u>	<u>0.40 ppm</u>	<u>-2.13 ppm</u>	<u>$\leq 6 \text{ ppm}$</u>
CEMS 2 O ₂ Dry	0.10 %	0.21 %	$\leq 0.5\%$
CEMS 2 O ₂ Wet	0.08 %	0.17 %	$\leq 0.5\%$
<u>CEMS 2 THC</u>	<u>0.02 ppm</u>	<u>-4.19 ppm</u>	<u>$\leq 6 \text{ ppm}$</u>

* EPA guidance for 40 CFR 503 sets the limits for calibration drift as no greater than 6 ppm for THC and 0.5% for O₂ for a 24 hour period.

Response Time Tests

Response time tests were performed on 01/15/2015 on both CEMS1 and CEMS2. All calibration gases are introduced as close to the CEMS probe outlet as possible. The analyzer reading was taken and 90% or 110% of the reading was calculated. Calibration gases were then introduced into the system and allowed to stabilize. The calibration gas flow was then cut off and the time required to reach 90% or 110% of the previous analyzer reading was recorded. The system was allowed to stabilize between each individual test and the test was repeated 2 additional times. The test was conducted using zero and high range gas for both O₂ and THC. The mean upscale and downscale response time was determined for each instrument and the maximum value of the two is presented in the table below.

Response Time Test Results

	O ₂ (dry)	O ₂ (wet)	THC CEMS	Criteria*
CEMS 1 Response Time	30 seconds	25 seconds	32 seconds	< 200 seconds
CEMS 2 Response Time	34 seconds	29 seconds	25 seconds	< 200 seconds

* EPA guidance for 40 CFR 503 states that response times should be 200 seconds or less for the O₂ and THC CEMS.

Calibration Error Test

Calibration error tests were conducted 01/15/2015. The O₂ and THC CEMS were each challenged with 3 different concentrations of calibration gas. The O₂ analyzers were challenged with a low range (2.01% O₂) gas, a mid-range (7.95%) gas, and high range (20.00%) gas. The THC analyzers were challenged with a low range (10.30 ppm) gas, a mid-range (49.90 ppm) gas and high range (79.30 ppm) gas. The gases were injected at the outlet of each probe prior to any sample conditioning. Data were recorded after the value stabilized. Three non-sequential injections of each calibration gas were performed during the test. The CEMS readings were recorded after a stable response was achieved and the difference between the CEMS value and calibration gas certified value were calculated. Mean calibration error from both CEMS1 and CEMS2 is presented in the following table.

Mean Calibration Error

	THC	Criteria*	O ₂ Dry	O ₂ Wet	Criteria*
CEMS 1					
Low-Range	0.03 ppm	≤ 5 ppm	0.01 %	0.01 %	≤ 0.5%
Mid-Range	-0.70 ppm	≤ 10 ppm	0.02 %	0.00 %	≤ 0.5%
High-Range	-0.50 ppm	≤ 10 ppm	-0.10 %	-0.17 %	≤ 0.5%
CEMS 2					
Low-Range	0.00 ppm	≤ 5 ppm	-0.01 %	-0.03 %	≤ 0.5%
Mid-Range	-0.63 ppm	≤ 10 ppm	0.01 %	-0.01 %	≤ 0.5%
High-Range	-0.13 ppm	≤ 10 ppm	0.10 %	0.10 %	≤ 0.5%

Where: Calibration Error = CEMS instrument response – Certified calibration gas value

* EPA guidance for 40 CFR 503 states that the mean difference between the CEMS and reference values at low, mid and high range should be no greater than 5 ppm for low range THC, 10 ppm for mid and high range THC, and 0.5% for all ranges of O₂.

The fourth quarter accuracy audit results indicate that CEMS1 and CEMS2 THC, O₂ dry, and O₂ wet parameters at the City of Bellingham Post Point Wastewater Treatment Plant are within regulatory requirements for the period 10/22/2014 - 01/15/2015.

Date: 08/10/2015

2015 Audit of Second Quarter Accuracy Summary Report

City of Bellingham personnel conducted a Quarterly Accuracy Audit (QAA) on the Total Hydrocarbon (THC) and Oxygen (O₂) continuous emission monitoring systems (CEMS) installed as part of incinerators # 1 and #2 at the Post Point Wastewater Treatment Plant. Testing was conducted to meet the requirements of 40 CFR part 503 subpart E. Testing procedures were based on procedures set down in the EPA document "THC Continuous Emission Monitoring Guidance for Part 503 Sewage Sludge Incinerators" (EPA 833-B-94-003). The QAA consisted of a 7-day, 24 hour calibration drift test (CDT), performed on 07/07/2015 - 07/13/2015 for CEMS2, and 07/20/2015 - 07/26/2015 for CEMS1, and a response time test (RTT) and calibration error test (CET), performed on 07/20/2015 for CEMS1 and 07/15/2015 for CEMS2.

Calibration Drift Tests

The CEMS automatically performs a CDT daily, using zero gas and span gas (70 to 90% of span). Calibration drift data for THC and O₂ were collected every 24 hours for the period from 07/07/2015 - 07/13/2015 for CEMS2, and 07/20/2015 - 07/26/2015 for CEMS1. The maximum 24-hour drift observed during the 7-day drift test is detailed below. Complete 7-day daily drift results are also provided with this report.

Calibration 7-Day Drift Test Result Summary

	Zero Drift (max day)	Span Drift (max day)	Criteria*
CEMS 1 O ₂ Dry	0.05 %	0.18 %	≤ 0.5%
CEMS 1 O ₂ Wet	0.08 %	0.39 %	≤ 0.5%
CEMS 1 THC	-0.01 ppm	-3.36 ppm	≤ 6 ppm
CEMS 2 O ₂ Dry	0.08 %	-0.04 %	≤ 0.5%
CEMS 2 O ₂ Wet	0.07 %	-0.12 %	≤ 0.5%
CEMS 2 THC	-0.10 ppm	-5.80 ppm	≤ 6 ppm

* EPA guidance for 40 CFR 503 sets the limits for calibration drift as no greater than 6 ppm for THC and 0.5% for O₂ for a 24 hour period.

Response Time Tests

Response time tests were performed on 07/20/2015 for CEMS1 and 07/15/2015 for CEMS2. All calibration gases are introduced as close to the CEMS probe outlet as possible. The analyzer reading was taken and 90% or 110% of the reading was calculated. Calibration gases were then introduced into the system and allowed to stabilize. The calibration gas flow was then cut off and the time required to reach 90% or 110% of the previous analyzer reading was recorded. The system was allowed to stabilize between each individual test and the test was repeated 2 additional times. The test was conducted using zero and high range gas for both O₂ and THC. The mean upscale and downscale response time was determined for each instrument and the maximum value of the two is presented in the table below.

Response Time Test Results

	O ₂ (dry)	O ₂ (wet)	THC CEMS	Criteria*
CEMS 1 Response Time	27 seconds	23 seconds	32 seconds	< 200 seconds
CEMS 2 Response Time	25 seconds	20 seconds	23 seconds	< 200 seconds

* EPA guidance for 40 CFR 503 states that response times should be 200 seconds or less for the O₂ and THC CEMS.

Calibration Error Test

Calibration error tests were conducted on 07/20/2015 for CEMS1 and 07/15/2015 for CEMS2. The O₂ and THC CEMS were each challenged with 3 different concentrations of calibration gas. The O₂ analyzers were challenged with a low range (2.01% O₂) gas, a mid-range (7.95%) gas, and high range (20.04%) gas. The THC analyzers were challenged with a low range (10.30 ppm) gas, a mid-range (49.9 ppm) gas and high range (80.4 ppm) gas. The gases were injected at the outlet of each probe prior to any sample conditioning. Data were recorded after the value stabilized. Three non-sequential injections of each calibration gas were performed during the test. The CEMS readings were recorded after a stable response was achieved and the difference between the CEMS value and calibration gas certified value were calculated. Mean calibration error from both CEMS1 and CEMS2 is presented in the following table.

Mean Calibration Error

	THC	Criteria*	O ₂ Dry	O ₂ Wet	Criteria*
CEMS 1					
Low-Range	-0.30 ppm	≤ 5 ppm	0.05 %	0.03 %	≤ 0.5%
Mid-Range	-0.03 ppm	≤ 10 ppm	0.09 %	0.07 %	≤ 0.5%
High-Range	0.37 ppm	≤ 10 ppm	-0.04 %	-0.07 %	≤ 0.5%
CEMS 2					
Low-Range	0.17 ppm	≤ 5 ppm	-0.02 %	-0.02 %	≤ 0.5%
Mid-Range	0.13 ppm	≤ 10 ppm	-0.03 %	-0.05 %	≤ 0.5%
High-Range	0.97 ppm	≤ 10 ppm	-0.07 %	-0.14 %	≤ 0.5%

Where: Calibration Error = CEMS instrument response – Certified calibration gas value

* EPA guidance for 40 CFR 503 states that the mean difference between the CEMS and reference values at low, mid and high range should be no greater than 5 ppm for low range THC, 10 ppm for mid and high range THC, and 0.5% for all ranges of O₂.

The second quarter accuracy audit results indicate that CEMS1 and CEMS2 THC, O₂ dry, and O₂ wet parameters at the City of Bellingham Post Point Wastewater Treatment Plant are within regulatory requirements for the period 04/17/2015 - 07/20/2015.

Date: 10/29/2015

2015 Audit of the Third Quarter Data Accuracy Summary Report

City of Bellingham personnel conducted a Quarterly Accuracy Audit (QAA) on the Total Hydrocarbon (THC) and Oxygen (O₂) continuous emission monitoring systems (CEMS) installed as part of incinerators #1 and #2 at the Post Point Wastewater Treatment Plant. Testing was conducted to meet the requirements of 40 CFR part 503 subpart E. Testing procedures were based on procedures set down in the EPA document "THC Continuous Emission Monitoring Guidance for Part 503 Sewage Sludge Incinerators" (EPA 833-B-94-003). The QAA consisted of a 7-day, 24 hour calibration drift test (CDT), performed on 10/17/15 - 10/23/15 for CEMS1 and CEMS2, and a response time test (RTT) and calibration error test (CET), performed on 10/23/2015 for CEMS1 and CEMS2.

Calibration Drift Tests

The CEMS automatically performs a CDT daily, using zero gas and span gas (70 to 90% of span). Calibration drift data for THC and O₂ were collected every 24 hours for the period from 10/17/15 - 10/23/15 for CEMS1 and CEMS2. The maximum 24-hour drift observed during the 7-day drift test is detailed below. Complete 7-day daily drift results are also provided with this report.

Calibration 7-Day Drift Test Result Summary

	Zero Drift (max day)	Span Drift (max day)	Criteria*
CEMS 1 O ₂ Dry	0.05 %	-0.38 %	≤ 0.5%
CEMS 1 O ₂ Wet	0.08 %	-0.35 %	≤ 0.5%
CEMS 1 THC	0.02 ppm	-3.04 ppm	≤ 6 ppm
CEMS 2 O ₂ Dry	0.09 %	0.08 %	≤ 0.5%
CEMS 2 O ₂ Wet	0.08 %	-0.14 %	≤ 0.5%
CEMS 2 THC	-0.10 ppm	-1.01 ppm	≤ 6 ppm

* EPA guidance for 40 CFR 503 sets the limits for calibration drift as no greater than 6 ppm for THC and 0.5% for O₂ for a 24 hour period.

Response Time Tests

Response time tests were performed on 10/23/2015 for CEMS1 and CEMS2. All calibration gases are introduced as close to the CEMS probe outlet as possible. The analyzer reading was taken and 90% or 110% of the reading was calculated. Calibration gases were then introduced into the system and allowed to stabilize. The calibration gas flow was then cut off and the time required to reach 90% or 110% of the previous analyzer reading was recorded. The system was allowed to stabilize between each individual test and the test was repeated 2 additional times. The test was conducted using zero and high range gas for both O₂ and THC. The mean upscale and downscale response time was determined for each instrument and the maximum value of the two is presented in the table below.

Response Time Test Results

	O ₂ (dry)	O ₂ (wet)	THC CEMS	Criteria*
CEMS 1 Response Time	27 seconds	23 seconds	28 seconds	< 200 seconds
CEMS 2 Response Time	29 seconds	24 seconds	23 seconds	< 200 seconds

* EPA guidance for 40 CFR 503 states that response times should be 200 seconds or less for the O₂ and THC CEMS.

Calibration Error Test

Calibration error tests were conducted on 10/23/2015 for CEMS1 and CEMS2. The O₂ and THC CEMS were each challenged with 3 different concentrations of calibration gas. The O₂ analyzers were challenged with a low range (2.01% O₂) gas, a mid-range (7.95%) gas, and high range (20.02%) gas. The THC analyzers were challenged with a low range (10.30 ppm) gas, a mid-range (49.9 ppm) gas and high range (80.5 ppm) gas. The gases were injected at the outlet of each probe prior to any sample conditioning. Data were recorded after the value stabilized. Three non-sequential injections of each calibration gas were performed during the test. The CEMS readings were recorded after a stable response was achieved and the difference between the CEMS value and calibration gas certified value were calculated. Mean calibration error from both CEMS1 and CEMS2 is presented in the following table.

Mean Calibration Error

	THC	Criteria*	O ₂ Dry	O ₂ Wet	Criteria*
CEMS 1					
Low-Range	-0.23 ppm	≤ 5 ppm	-0.02 %	-0.04 %	≤ 0.5%
Mid-Range	0.60 ppm	≤ 10 ppm	-0.12 %	-0.15 %	≤ 0.5%
High-Range	1.17 ppm	≤ 10 ppm	-0.39 %	-0.29 %	≤ 0.5%
CEMS 2					
Low-Range	0.07 ppm	≤ 5 ppm	-0.01 %	-0.01 %	≤ 0.5%
Mid-Range	0.63 ppm	≤ 10 ppm	-0.03 %	-0.05 %	≤ 0.5%
High-Range	1.73 ppm	≤ 10 ppm	-0.02 %	-0.02 %	≤ 0.5%

Where: Calibration Error = CEMS instrument response – Certified calibration gas value

* EPA guidance for 40 CFR 503 states that the mean difference between the CEMS and reference values at low, mid and high range should be no greater than 5 ppm for low range THC, 10 ppm for mid and high range THC, and 0.5% for all ranges of O₂.

The third quarter accuracy audit results indicate that CEMS1 and CEMS2 THC, O₂ dry, and O₂ wet parameters at the City of Bellingham Post Point Wastewater Treatment Plant are within regulatory requirements for the period 07/20/2015 - 10/23/2015.



ANALYSIS REPORT

City Of Bellingham
200 McKenzie Ave
Bellingham, WA 98225
Attention: Peg Wendling

Date Received: 01/15/2015
Date Reported: 02/05/2015

AM TEST Identification Number
Client Identification
Sampling Date

15A000623
Incinerator Cake
01/12/2015

PARAMETER	CAS #	RESULT	MDL	PQL
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Conventionals

Total Solids (%)	22.1	0.1
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Total Metals

Arsenic (ug/g)	7740-38-2	<2.9	0.75	2.9
Beryllium (ug/g)	7440-41-7	<0.145	0.035	0.145
Cadmium (ug/g)	7440-43-9	<0.725	0.183	0.725
Chromium (ug/g)	7440-47-3	21.	0.33	1.45
Copper (ug/g)	7440-50-8	211	0.07	0.29
Iron (ug/g)	7439-89-60	9320	0.7	2.9
Mercury (ug/g)	7439-97-6	0.198	0.005	0.02
Manganese (ug/g)	7439-96-5	170	0.07	0.29
Nickel (ug/g)	7440-02-0	14.	0.33	1.45
Lead (ug/ g)	7439-92-1	21.	0.70	2.9
Silver (ug/g)	7440-22-4	2.53	0.33	1.45
Sulfur	7704-34-9	4900	3.3	14
Zinc (ug/g)	7440-66-6	395	0.07	0.29

Metals values reported on a "dry weight basis".



ANALYSIS REPORT

City Of Bellingham
200 McKenzie Ave
Bellingham, WA 98225
Attention: Peg Wendling

Date Received: 03/19/2015
Date Reported: 04/10/2015

AM TEST Identification Number
Client Identification
Sampling Date

15A003764
Incinerator Cake
03/18/2015

PARAMETER	CAS #	RESULT	MDL	PQL
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Conventionals

Total Solids (%)	23.8	0.1
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Total Metals

Arsenic (ug/g)	7740-38-2	<2.6	0.75	2.6
Beryllium (ug/g)	7440-41-7	<0.13	0.035	0.13
Cadmium (ug/g)	7440-43-9	<0.652	0.183	0.652
Chromium (ug/g)	7440-47-3	13.	0.33	1.30
Copper (ug/g)	7440-50-8	171	0.07	0.26
Iron (ug/g)	7439-89-60	6180	0.7	2.6
Mercury (ug/g)	7439-97-6	0.124	0.005	0.02
Manganese (ug/g)	7439-96-5	125	0.07	0.26
Nickel (ug/g)	7440-02-0	10.	0.33	1.3
Lead (ug/ g)	7439-92-1	16.	0.70	2.6
Silver (ug/g)	7440-22-4	<1.3	0.33	1.3
Sulfur	7704-34-9	4410	3.3	13
Zinc (ug/g)	7440-66-6	381	0.07	0.26

Metals values reported on a "dry weight basis".



ANALYSIS REPORT

City Of Bellingham
200 McKenzie Ave
Bellingham, WA 98225
Attention: Peg Wendling

Date Received: 05/21/2015
Date Reported: 06/29/2015

AM TEST Identification Number
Client Identification
Sampling Date

15A007602
Incinerator Cake
05/19/2015

PARAMETER	CAS #	RESULT	MDL	PQL
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Conventionals

Total Solids (%)	23.9	0.1
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Total Metals

Arsenic (ug/g)	7740-38-2	<7.8	0.75	7.8
Beryllium (ug/g)	7440-41-7	<0.39	0.035	0.39
Cadmium (ug/g)	7440-43-9	<1.96	0.183	1.96
Chromium (ug/g)	7440-47-3	13.	0.33	1.30
Copper (ug/g)	7440-50-8	184	0.07	0.26
Iron (ug/g)	7439-89-60	4730	0.7	2.6
Mercury (ug/g)	7439-97-6	0.104	0.005	0.02
Manganese (ug/g)	7439-96-5	135	0.07	0.26
Nickel (ug/g)	7440-02-0	7.07	0.33	1.3
Lead (ug/g)	7439-92-1	22.	0.70	2.6
Silver (ug/g)	7440-22-4	<3.9	0.33	3.9
Sulfur	7704-34-9	4690	3.3	13
Zinc (ug/g)	7440-66-6	345	0.07	0.26

Metals values reported on a "dry weight basis".



ANALYSIS REPORT

City Of Bellingham
200 McKenzie Ave
Bellingham, WA 98225
Attention: Peg Wendling

Date Received: 07/22/15
Date Reported: 08/03/15

AM TEST Identification Number

15A011491

Client Identification

Incinerator Cake

Sampling Date

07/20/15 12:00

PARAMETER	CAS #	RESULT	MDL	PQL
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Conventionals

Total Solids (%)	22.9	0.1
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Total Metals

Arsenic (ug/g)	7740-38-2	<3.1	0.90	3.1
Beryllium (ug/g)	7440-41-7	<0.16	0.023	0.16
Cadmium (ug/g)	7440-43-9	<0.79	0.023	0.79
Chromium (ug/g)	7440-47-3	11.8	0.046	0.79
Copper (ug/g)	7440-50-8	211	0.090	0.32
Iron (ug/g)	7439-89-60	5680	0.90	3.2
Mercury (ug/g)	7439-97-6	0.279	0.003	0.010
Manganese (ug/g)	7439-96-5	182	0.023	0.32
Nickel (ug/g)	7440-02-0	9.26	0.046	0.32
Lead (ug/g)	7439-92-1	35.	0.09	3.1
Silver (ug/g)	7440-22-4	<1.58	0.09	1.58
Sulfur (ug/g)	7704-34-9	5240	0.46	15.8
Zinc (ug/g)	7440-66-6	445	0.045	0.32

Metals values reported on a "dry weight basis".



ANALYSIS REPORT

City Of Bellingham
200 McKenzie Ave
Bellingham, WA 98225
Attention: Peg Wendling

Date Received: 09/17/15
Date Reported: 10/3/15

AM TEST Identification Number 15A015118
Client Identification Incinerator Cake
Sampling Date 09/15/2015

PARAMETER	CAS #	RESULT	PQL	MDL
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Conventionals

Total Solids (%) 21.9 0.1

Total Metals

Arsenic (ug/g)	7740-38-2	<11.9	11.9	2.4
Beryllium (ug/g)	7440-41-7	<0.59	0.59	0.12
Cadmium (ug/g)	7440-43-9	<2.97	2.97	0.59
Chromium (ug/g)	7440-47-3	10.4	5.94	1.19
Copper (ug/g)	7440-50-8	158	1.19	0.24
Iron (ug/g)	7439-89-60	5000	11.9	2.4
Mercury (ug/g)	7439-97-6	0.230	0.02	0.004
Manganese (ug/g)	7439-96-5	170	1.19	0.24
Nickel (ug/g)	7440-02-0	6.93	5.94	1.19
Lead (ug/g)	7439-92-1	<11.9	11.9	2.4
Silver (ug/g)	7440-22-4	<5.94	5.94	1.19
Sulfur (ug/g)	7704-34-9	3920	59.4	11.9
Zinc (ug/g)	7440-66-6	295	1.19	0.24

Metals values reported on a "dry weight basis".



ANALYSIS REPORT

City Of Bellingham
200 McKenzie Ave
Bellingham, WA 98225
Attention: Peg Wendling

Date Received: 11/10/2015
Date Reported: 11/24/2015

AM TEST Identification Number
Client Identification
Sampling Date

15A018297
Incinerator Cake
11/08/2015

PARAMETER	CAS #	RESULT	PQL	MDL
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Conventionals

Total Solids (%)	24.18	0.1
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Total Metals

Arsenic (ug/g)	7740-38-2	<12.1	12.1	2.4
Beryllium (ug/g)	7440-41-7	<0.61	0.61	0.12
Cadmium (ug/g)	7440-43-9	<3.0	3.0	0.59
Chromium (ug/g)	7440-47-3	13.6	5.94	1.19
Copper (ug/g)	7440-50-8	136	1.21	0.24
Iron (ug/g)	7439-89-60	5410	12.1	2.4
Mercury (ug/g)	7439-97-6	0.781	0.02	0.004
Manganese (ug/g)	7439-96-5	155	1.21	0.24
Nickel (ug/g)	7440-02-0	11.8	5.94	1.19
Lead (ug/g)	7439-92-1	24.8	12.1	2.4
Silver (ug/g)	7440-22-4	<6.1	6.1	1.19
Sulfur (ug/g)	7704-34-9	4420	59.4	11.9
Zinc (ug/g)	7440-66-6	342	1.21	0.24

Metals values reported on a "dry weight basis".

